A GAS-INSULATED MULTI-PHASE LINE, AND A CONNECTION MODULE FOR GOING FROM MULTI-PHASE TO SINGLE-PHASE IN SUCH A LINE

FIELD OF THE INVENTION

The invention relates to a gas-insulated multi-phase line made up of sections, each of which is formed by metal cladding filled with a dielectric gas under pressure and containing the phase conductors. This type of line must be capable of receiving current-measuring instruments or the like, such as a current transformer. In order to install a multi-phase transformer, it is necessary for the windings that form the secondary of the transformer to be disposed around respective ones of the phase conductors, these conductors being disposed in the same tubular metal cladding filled with an insulation gas under a pressure of a few bars. At present, the windings are mounted inside the metal enclosure of a connection module between two adjacent line sections and they are thus immersed in the dielectric insulation gas. That configuration of windings requires the electrical wires of the secondary to be passed through the metal enclosure of the module via gastight feedthroughs, which is particularly costly to achieve. Since the windings are disposed inside the enclosure, the internal volume of the module must be designed accordingly, which poses problems of resistance to pressure for the enclosure and for the gastight feedthroughs.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the invention is to mitigate the above-mentioned drawbacks.

To this end, the invention provides a gas-insulated multi-phase line made up of sections, each of which is formed by metal cladding filled with a dielectric gas under pressure and containing at least three phase conductors disposed in a triangle configuration, wherein two adjacent sections are connected together via a connection module whose metal cladding is locally made up of a plurality of tubular portions, each of which is

filled with dielectric gas and has a single phase conductor passing through it constituting a passive electrical connection.

With this local structure for the line, it is possible to mount the windings of the secondary of a current transformer in air around the tubular portions, which contributes to reducing significantly the manufacturing cost and the maintenance cost of the current transformer.

The invention also provides a connection module for such a gas-insulated line, as well as a method of assembling such a connection module so that it can receive the secondary windings of a current transformer.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of a gas-insulated multi-phase line of the invention and of the connection module is shown in the drawings, in which:

Figure 1 is a diagrammatic view showing two adjacent sections of a multi-phase line with a connection module of the invention having a plurality of tubular portions;

Figure 2 is a diagrammatic perspective view showing the connection module of Figure 1 as equipped with windings around the tubular portions to constitute a current transformer; and

Figure 3 is a diagrammatic view in longitudinal section showing the connection module of Figure 2, two out of three phases being shown offset in depth.

MORE DETAILED DESCRIPTION

In Figure 1, the multi-phase line (which is a three-phase line in this example) is made up of sections 12, 13, each of which is formed by metal cladding 10 filled with a dielectric gas under a pressure of a few bars. The three phase conductors of each section 12 or 13 are immersed in the dielectric gas and are disposed in parallel with one another in an equilateral triangle configuration, in conventional manner. The two adjacent sections 12 and 13 are connected together via a

connection module 11 whose metal cladding 1 is locally made up of as many tubular portions as there are phase conductors, and, in the present example, of three tubular portions 3A, 3B, 3C that can be seen in Figure 2. Each tubular portion is filled with dielectric gas and a single phase conductor 6A, 6B, 6C passes through it so that the module makes it possible to go locally from common cladding for all three phases to three single phases each clad individually.

The invention applies to any multi-phase line having at least three phases. For example, a connection module can have four single-phase cladding portions in a four-phase line of the invention.

As shown in Figure 2, the connection module 11 is open at both of its ends so that the volumes of the sections 12 and 13 communicate with each other. It is also possible for the module 11 to be closed in gastight manner by one or more insulators at either or both of its ends for the purpose of electrically isolating the two adjacent sections 12, 13 from each other, or of electrically isolating said module from said sections.

As shown in Figures 2 and 3, the metal cladding 1 of the module 11 is made up of a first end cap 2 and of a second end cap 2', each of which is dish-shaped and is provided with orifices 4, 5 of aperture determined to enable the phase conductors 6A, 6B, 6C to pass through them with a sufficient isolation distance between each conductor and the cladding 1.

Each of the tubular portions 3A, 3B, 3C of the cladding is formed by a link tube that surrounds an orifice 4 in the first end cap 2 and an orifice in the second end cap 2', the same phase conductor passing through both of these orifices.

The module may be made up of two complementary molded pieces, with one of the two pieces being constituted by an end cap such as 2 extended by the link tubes so as to form a single piece therewith.

The tubular portions 3A, 3B, 3C are preferably mutually parallel, and, in a three-phase configuration, they are preferably disposed in an equilateral triangle configuration so as to make the enclosure 1 as compact as possible. Each of them is surrounded by a determined volume of air, in which it is possible to place a winding 7A, 7B, 7C of the secondary of a current transformer, as shown in Figures 2 and 3. Each winding 7A, 7B, 7C thus surrounds a tubular portion 3A, 3B, 3C in air. The connection module of the invention is not exclusively designed for installing current transformers, it is possible for measurement sensors or the like (not shown) to be disposed in air around or in the vicinity of respective ones of the tubular portions 3A, 3B, 3C. If it is not necessary for the sensors to surround the respective phase conductors completely, the tubular portions may be disposed to be touching or almost touching, in order to improve the compactness of the enclosure.

The link tubes may advantageously be separate from and mounted on one of the end caps, and fixed thereto by interfitting and welding, e.g. so as to make it simple to install the windings around the tubes. More particularly, in order to assemble the connection module 11 with secondary windings of a current transformer, firstly each winding is put in place around the respective link tube, and then the two end caps are assembled together via the link tubes so as to form the cladding of the module 11. Then a phase conductor is passed through each link tube.

Naturally, it is possible to consider other embodiments of the module 11 of the invention with link tubes that are cylindrical or otherwise, parallel or otherwise, and of shape more complex than the shape shown in the figures.